

# LETTERS

## Questions About Miniscrews

**R**egarding your Editor's Corner, "Answering the Questions About Miniscrews", in the January 2005 issue of JCO: Your initial reluctance to endorse such procedures was, I believe, well warranted. I don't feel orthodontists in the United States or any other country should feel they have "fallen behind" for not enthusiastically endorsing miniscrews as a source of intraoral anchorage.

The comprehensive article in that same issue, "Clinical Applications of the Miniscrew Anchorage System", by Dr. Carano and colleagues, documents successful applications of skeletal anchorage to achieve various orthodontic tooth movements. The problems and limitations of miniscrews are also clearly pointed out in this excellent article, which I would recommend to all your readers. However, the literature and records of finished cases in private offices and postgraduate orthodontic programs around the world demonstrate similar orthodontic corrections treated equally as well without skeletal anchorage. The question, then, is why use invasive procedures if the results are no better and treatment times no shorter than with non-invasive techniques? It seems the debate on miniscrews should not be about who places them, but rather who needs them and why. It is not enough to do an orthodontic procedure just because you can. It must be justified by the end result being advantageous to the patient and the orthodontist.

The interest in skeletal anchorage raises, I believe, a much bigger issue—that of force values in orthodontics. For the past 50 years, spurred by Begg's 1956 article, "Differential force in orthodontic treatment",<sup>1</sup> the trend has been to use lower, lighter forces. As force levels drop, anchorage requirements also drop. So low, in fact, that it has been shown that it is not necessary to use headgears or palatal bars or to include second molars to enhance anchorage in even the most severe malocclusions.<sup>2</sup>

The use of miniscrews could, I believe, lead to the use of unnecessary, even deleterious, heavy forces. This is evident from the authors' state-

ment, "Miniscrews can be used instead when heavy forces are required to bring an impacted canine into occlusion." Heavy forces should *never* be applied to impacted teeth. This causes them to resist movement and become, in effect, "anchor teeth". I have seen the records of a patient with a wire wrapped around the neck of an impacted canine (such a procedure is no longer necessary and definitely not recommended), where such great force was applied that the adjacent teeth were intruded from reciprocal forces. The subsequent use of light force (approximately 1oz) permitted reversal of the intrusion and rapid eruption of the canine.

The suggested use of skeletal anchorage for molar intrusion seems the most appropriate, considering the advantageous vertical force vectors and the lack of reciprocal extrusive forces on other teeth. However, the authors do point out the difficulty in proper placement of miniscrews in such cases and recommend only unilateral application. As alternative, non-invasive means of posterior tooth intrusion, I would first consider using elastics with an Essix appliance<sup>3</sup> or employing fixed or removable magnets.<sup>4</sup>

Actually, many of the problems purported to be "solved" or addressed by miniscrews in this article are actually manmade, caused by Angle's edgewise slot itself. These include:

- Deepening of the anterior bite when closing posterior spaces.
- Difficulty intruding anterior teeth and correcting dental midlines.
- Need for heavy forces to overcome sliding and active friction and to correct Class II and III interarch discrepancies.

These obstacles to desired tooth movements, which are directly related to the Angle slot, were recognized long ago by one of his best students: "each and every tooth is now an anchorage auxiliary".<sup>5</sup> If one is going to use a slot designed in 1925, one is going to have to be prepared to fight 80-year-old battles that may require enhanced anchorage. There have been tremendous strides in the past 50 years—both in archwire metallurgy and slot geometry. Why ignore them? It is now possible to utilize pread-

justed, edgewise-type brackets in conjunction with light intraoral traction forces of 2-3oz to achieve rapid anterior bite opening, Class II or III corrections, and space closure when required.<sup>6</sup>

In view of the above, not to mention the effect invasive surgical procedures could have on referrals, increases in liability and associated insurance premiums, and overall patient anxiety, I don't feel any orthodontist should consider skeletal anchorage as "a mainline clinical technique."

PETER KESLING, DDS, SCD

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### Author's Reply

**F**irst of all, I am very pleased that this open discussion of skeletal anchorage has been started between orthodontists in the United States and those in the rest of the world, as I believe it will be highly beneficial. I would like to begin my response to Dr. Kesling with the initial issue in the debate—that is, who should insert the miniscrew. We are strongly convinced that for the best patient management and most efficient clinical application, it should be the orthodontist. With apologies to the researcher cited in the Editor's Corner by Dr. Keim, the Wild West he has seen exists only in John Wayne's movies. In Europe, and I believe even in Asia, there are well-defined regulations that allow the orthodontist more clinical freedom, so that we can use our expertise in matters that may be outside the realm of traditional orthodontics. This has been the basis of our study, promotion,

and testing of skeletal anchorage with miniscrews in clinical orthodontics.

Furthermore, I want to make clear that before presenting our Miniscrew Anchorage System (MAS) to the world, the late Dr. Aldo Carano and I, together with the entire team at the University of Ferrara Department of Orthodontics (directed by Prof. Giuseppe Siciliani), thoroughly investigated this complex issue with original research into subjects such as the safe drilling zones in the bone.<sup>1</sup> We also tested various types of screws, creating three prototypes before achieving the final screw that is now available. We have applied and improved the surgical procedure for some time, making sure that the clinical results in all their biological and biomechanical aspects, together with the patient's reactions, were carefully monitored.<sup>2</sup> In other words, the MAS is a device that has been thoroughly tested over the last five years by different clinicians, following precise guidelines and indications.

That the "vexata quaestio" of whether orthodontic treatment should be done with so-called heavy or light forces is still debated does not reduce, in my opinion, the validity of skeletal anchorage obtained with miniscrews. Dr. Kesling's preference for using light forces that, according to his experience, would eliminate the need for miniscrews should not obscure the fact that the Begg technique is not commonly used in the rest of the world. In fact, we have received strong feedback from many clinicians regarding the effectiveness of miniscrews as skeletal anchorage.

On one point I agree with Dr. Kesling: that many orthodontic problems could be managed without miniscrews. In our experience, however, because it is a simple and minimally invasive technique (it takes no longer than five minutes to place a screw), without complications or the need for drug therapy either before or after insertion (only two screws out of a sample of 543 have caused local inflammation), and very comfortable for the patient, we strongly recommend this method to solve traditional orthodontic problems in a short time, without the need for patient coop-

eration and with less stress for the clinician. I do not use any system “just because I can”, but because I have found it a more effective and efficient alternative to solving my old problems.

All of our readers should be aware that they are looking at only the most obvious aspect of miniscrews—skeletal anchorage—but that this is not the only reason for using them. For example, there is a biomechanical advantage in that miniscrews can be placed almost anywhere intraorally. By moving them closer to the center of resistance of the teeth, we can get a more bodily, and therefore more physiological, tooth movement. This not only saves time and eliminates the need for intraoral auxiliaries, but is much more comfortable for the patient than traditional orthodontic appliances.

It is possible that some biomechanical problems are “manmade”, as Dr. Kesling has pointed out; on the other hand, I see situations that would be impossible or very difficult to resolve without using miniscrews. He suggests molar intrusion with Essix appliances or magnets, but I would question the need for patient compliance with the Essix and elastics, and the comfort and cost of magnets. Are these systems any more effective than skeletal anchorage? We are the first to admit (and I thank Dr. Kesling for pointing it out) that at the moment, intrusion of an entire arch is not possible with miniscrews, but single-tooth intrusion is highly effective and predictable, with light forces (a maximum of 1-2oz). The use of miniscrews does not necessarily imply using “heavy forces”.

With an impacted canine, it is always possible that exposure of the tooth will reveal ankylosis or close proximity to other teeth within the bone. In this case, whether the forces used are light or heavy, all applied forces will unload on the anchorage teeth. The main point is one of timing; the orthodontist should wait for eruption of the canine before continuing with treatment, because the remainder of the arch will be used as anchorage no matter what force is applied. On the other hand, if we insert a miniscrew as anchorage, there are no adverse side effects, and we can continue treatment on the remaining denti-

tion. The case that we showed in our JCO article is an example of this concept. We saved 10 months of fixed appliance treatment with this patient because we used only two miniscrews to bring the impacted canine into the arch.

As Dr. Kesling implies, there are other questions yet to be resolved, including anchorage in edentulous areas, vertical control of the occlusal plane, and anchorage for intraoral devices such as the Distal Jet or Pendulum and for orthopedic devices such as the Delaire mask. At present, we are investigating all of these areas.

We strongly believe, based on scientific evidence borne out by clinical application, that skeletal anchorage with miniscrews not only offers the orthodontist an improvement in the effectiveness of clinical systems, but also provides a number of alternative solutions. In this initial phase of great enthusiasm, as in any new endeavor, there will undoubtedly be excesses. For that reason, it is essential that we set up standards and guidelines for rational miniscrew applications. The contributions of American orthodontists, thanks to their considerable clinical experience and their cultural and scientific traditions, will be of fundamental importance.

STEFANO VELO, MD, DDS

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#### Additional Reply

Since I was probably one of the first involved in the use of mini-implants (since 1995), I have the pleasure of answering Dr. Kesling's letter. He is right in stating that orthodontists in the United States do not need to feel they have fallen behind. Actually, Creekmore was the first to publish on skeletal anchorage.<sup>1</sup> Still, it has to be admitted that the recent burst of papers on skeletal anchorage does not come from the U.S.

Dr. Kesling and I agree that skeletal anchorage is here neither to replace other types of anchorage nor to treat non-compliant patients. On the other hand, skeletal anchorage definitely widens the spectrum of orthodontics. As an early example, when Roberts and colleagues inserted a retromolar implant, it became possible to bring molars forward without adverse effects on the anterior unit.<sup>2</sup>

Unfortunately, as Dr. Keim points out in the Editor's Corner, the situation today *is* much like the Wild West.<sup>3</sup> Many implant systems are popping up, and few indeed with a scientific basis. Many authors are so eager to show their particular systems that they refrain from waiting for the cases to be finished. I believe miniscrews are here to stay, but I think that, as with many other appliances, there will be an initial wave in which they may be used indiscriminately before they find their proper place. In some universities, at least, the use of the mini-implant is now on solid scientific ground.

Dr. Kesling draws attention to the trend of reducing force levels and mentions that "the use of miniscrews could lead to unnecessary, even deleterious forces". The force levels, I believe, are independent of the use of skeletal anchorage, and the statement by Dr. Carano and colleagues that heavy forces should be used to bring a canine into the arch must be considered the authors' own approach. Unfortunately, as Dr. Kesling also states, many of the problems we fight are manmade.

He is correct that many of the cases presented could have been corrected without skele-

tal anchorage. There may, however, be situations in which adverse effects can most efficiently be controlled by skeletal anchorage. Examples of such cases are shown in my article in this issue.

I am happy that JCO has taken up the question of mini-implants in its Editor's Corner. Skeletal anchorage will be a supplement to help with problems that cannot be solved by any preadjusted techniques. In addition to being a great support to adult orthodontics, as we have seen in recent issues of the journal, it has become a steadily growing part of our clinical practice.

BIRTE MELSEN, DDS, DO

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3. Keim, R.G.: Editor's Corner: Answering the questions about miniscrews, *J. Clin. Orthod.* 39:7-8, 2005.

#### CORRECTION

An article by Dr. Alberto Caprioglio, "A new device for forced eruption of palatally impacted canines" (*JCO*, June 2004), should have referenced an earlier work by Dr. Harry Jacoby, "The 'ballista spring' system for impacted teeth," *Am. J. Orthod.* 75:143-151, 1979. *JCO* and the author regret the omission.